

CLAIMS

1. Moulding method, carried out by a mould for a conventional injection press, suitable for cost-effectively realising a piece in one or more injectable materials, said mould comprising a mobile part, fixed to a mobile side of said press, and a fixed part, fixed to a fixed side of said press, on said mobile and fixed parts being realised respective impressions, in various number and configuration, which define, when said mobile part is closed against said fixed part, recesses suitable for receiving said injectable materials in at least two successive injection steps, characterised in that it comprises the following steps:
- a step of housing a sliding element in at least a first of said recess;
 - a first injection step in said first recess, after which a first part of said piece remains fixed on a surface integral to said sliding element;
 - a displacement step of said first part of this piece in a second recess, through translating movement of said sliding element with respect to said fixed part of the mould;
 - a second injection step in said second recess.
2. Moulding method according to claim 1, characterised in that said integral surface is an outer surface of

said sliding element.

3. Moulding method according to claim 1, characterised
in that said integral surface comprises an insert.

4. Moulding method according to claim 1, characterised
5 in that it comprises steps for carrying out various
operations complementary to the moulding operation,
such as inserting, labelling, tampography or other.

5. Moulding method according to claim 1, characterised
in that it comprises further injection steps in
10 further recesses.

6. Mould (10; 110; 210; 310; 410; 510; 610; 710; 810;
910; 1010; 1110; 1210; 1310; 1410; 1510; 1610; 1610b;
1610c; 1710; 1810; 1910; 2010) for a conventional
injection press, suitable for cost-effectively
15 realising a piece in one or more injectable
materials, of the type comprising a mobile part (14;
114; 214; 314; 414; 514; 614; 714; 814; 914; 1014;
1114; 1214; 1314; 1414; 1514; 1614; 1614b; 1614c;
1714; 1814; 1914; 2014), fixed to a mobile side of
20 said press, and a fixed part (12; 112; 212; 312; 412;
512; 612; 712; 812; 912; 1012; 1112; 1212; 1312;
1412; 1512; 1612; 1612b; 1612c; 1712; 1812; 1912;
2012), fixed to a fixed side of said press, on said
mobile (14; 114; 214; 314; 414; 514; 614; 714; 814;
25 914; 1014; 1114; 1214; 1314; 1414; 1514; 1614; 1614b;
1614c; 1714; 1814; 1914; 2014) and fixed (12; 112;

212; 312; 412; 512; 612; 712; 812; 912; 1012; 1112;
1212; 1312; 1412; 1512; 1612; 1612b; 1612c; 1712;
1812; 1912; 2012) parts being realised respective
impressions, in various number and configuration,
5 which define, when said mobile part is closed against
said fixed part, recesses (16, 18; 116, 118; 216,
218; 316, 318; 416, 417, 418; 516, 518; 616, 618;
716, 718; 816, 818; 916, 918; 1016, 1018, 1019; 1116,
1118; 1216, 1218; 1316, 1318; 1416, 1418; 1516, 1518;
10 1616, 1618; 1616b, 1.618b; 1616c, 1618c; 1716, 1718;
1816, 1818; 1916, 1918; 2016, 2018) suitable for
receiving said injectable materials in at least two
successive injection steps, characterised in that at
least a first of said recesses (16; 116; 216; 316;
15 416; 516; 616; 716; 816; 916; 1016; 1116; 1216; 1316;
1416; 1516; 1616; 1616b; 1616c; 1716; 1816; 1916;
2016), where a first injection step takes place,
comprises a sliding element (20; 120; 220; 320; 420;
520; 620; 720; 820; 920; 1020; 1120; 1220; 1320;
20 1420; 1520; 1620; 1620b; 1620c; 1720; 1820; 1920;
2020), on a surface integral with said sliding
element a first part (56; 156; 256; 356; 456; 556;
656; 756; 856; 956; 1056; 1156; 1256; 1356; 1456;
1556; 1656; 1756; 1856; 1956; 2056) of said piece
25 remaining fixed, said first part (56; 156; 256; 356;
456; 556; 656; 756; 856; 956; 1056; 1156; 1256; 1356;

1456; 1556; 1656; 1756; 1856; 1956; 2056) of said piece being successively carried by said sliding element (20; 120; 220; 320; 420; 520; 620; 720; 820; 920; 1020; 1120; 1220; 1320; 1420; 1520; 1620; 1620b; 5 1620c; 1720; 1820; 1920; 2020), equipped with translating movement with respect to said fixed part of said mould, in a second of said recesses (18; 118; 218; 318; 418; 518; 618; 718; 818; 918; 1018; 1118; 1218; 1318; 1418; 1518; 1618; 1718; 1818; 1918; 10 2018), where a second injection step takes place.

7. Mould (10) according to claim 6, characterised in that said recesses (16, 18) are four in number, in that said elements (20) are two in number and are equipped with translating movement along an axis 15 substantially perpendicular to a longitudinal axis of the mould (10).

8. Mould (10) according to claim 7, characterised in that it realises a piece such as a sleeve with inner gaskets, said first parts (56) of finished piece, 20 formed in said first recesses (16), being said gaskets, said first recesses (16) being defined by an outer support of inserts (22) on said sliding elements (20) .

9. Mould (10) according to claim 8, characterised in 25 that said gaskets are in thermoplastic elastomer.

10. Moulding method carried out by a mould (10)

according to claim 9, characterised in that it comprises the following steps:

- a first injection step of an injectable material in said first recesses (16), to realise inner gaskets;
- 5 - a cooling step of said injected material;
- a step of opening said mould 10;
- a removal step of feedheads with extractors and an opening step of inserts (22) which formed said first recesses (16);
- 10 - a re-entry step of said extractors and a displacement step of said sliding elements (20), to define said second recess (18);
- a second injection step of an injectable material in said second recess (18), which takes place after
- 15 having previously closed said mould (10);
- a cooling step of said material injected into said second recess (18);
- a step of opening said mould 10;
- a displacement of said sliding elements (20) to
- 20 return to an initial position;
- removal of feedheads and of said finished piece;
- an advancing step of said inserts (22) and of sliding back of said extractors;
- a closing step of said mould (10), which coincides
- 25 with a start of cycle step.

11. Method according to claim 10, characterised in

that said sliding elements (20) are mounted on sliding trolleys, where said trolleys slide back slipping off said sliding elements (20) from said gaskets.

- 5 12. Mould (110) according to claim 6, characterised in that it realises a piece such as a sleeve with six inlets.
13. Mould (210) according to claim 6, characterised in that it realises a body equipped with an inner gasket
10 similar to a sealed container.
14. Mould (310) according to claim 6, characterised in that it realises a sleeve in series, able to be realised in very small sizes and similar to an aid to sealably join tubes or electrical wires.
- 15 15. Mould (410) according to claim 6, characterised in that it realises a sleeve in five parts, of said sleeve being firstly, in a first semi-cycle, moulded gaskets in first recesses (416) and a central part in further recesses (417), in the subsequent semi-cycle
20 said central parts being conveyed through a guided insert (421), where said further recesses (417) are housed, said insert (421) being connected to a table in a subsequent position near to said second recesses (418).
- 25 16. Mould (410) according to claim 15, characterised in that on said gaskets, pressed against a central

part of said sleeve, parts are overmoulded which stably connect components, the sleeve being kept empty inside.

17. Mould (510) according to claim 6, characterised in
5 that it realises a curved shaped sleeve,
18. Mould (610) according to claim 6, characterised in
that it realises a curved sleeve obtained from many overmoulded shots.
19. Mould (710) according to claim 6, characterised in
10 that it realises a flat surface equipped with side gaskets, in a first step perimetric pieces being moulded and in a second step said flat surface being moulded.
20. Mould (810) according to claim 6, characterised in
15 that it realises a flat surface having a framed box-shaped structure.
21. Mould (810) according to claim 20, characterised
in that perimetric parts of said flat surface have a complex shape and a non-constant section.
- 20 22. Mould (910) according to claim 6, characterised in
that it realises a distributor equipped with relative gaskets.
23. Mould (1010) according to claim 6, characterised
in that it realises an eyeglass frame complete with
25 arms and relative hinges with elastic joints, said sliding element (1020) taking up three different

positions to realise in succession said first recess (1016), a further recess (1019) and said second recess (1018).

24. Mould (1010) according to claim 23, characterised
5 in that it also actuates an injection step to realise lenses.

25. Mould (1010) according to claim 24, characterised in that said lenses are made from poly(methyl metacrylate) PMMA.

10 26. Mould (1110) according to claim 6, characterised in that it realises a valved cap, wherein a support serves as a base for a patella which acts as a valve, a trolley which conveys a first shot inside said second recess (1118) follows a non-linear movement so
15 as to avoid collisions with walls of said recess (1118).

27. Mould (1210) according to claim 6, characterised in that it realises a body with inner and outer gaskets of complex composition, wherein said sliding
20 elements (1220), on which gaskets are moulded in a first semi-cycle, interpenetrate to be arranged for a second injection step, a replacement of recesses being ensured by a lowering of a descending core on which trolleys close.

25 28. Mould (1210) according to claim 27, characterised in that a trolley is moved by a column and a removal

of a finished piece is ensured by stopping in telescope sequence, a second trolley being moved by a tilted column where a jack takes care of a displacement for a change of stroke.

- 5 29. Mould (1310) according to claim 6 or 27, characterised in that a positioning of an axis of a piece is parallel to an axis of the press.
30. Mould (1410) according to claim 6, characterised in that it realises a kinematism, using non-
10 chemically adhesive materials, said sliding elements (1420) alternatively displacing horizontally and vertically.
31. Mould (1510) according to claim 6, characterised in that said sliding element (1520) comprises an
15 impression part (1516, 1518), so that said impression (1516, 1518) translates following one or more stages.
32. Mould (1510) according to claim 31, characterised in that for each of said stages an injection step or a different operation like labelling or other takes
20 place.
33. Mould (1510) according to claim 31, characterised in that it realises a three-layer beaker.
34. Mould (1610) according to claim 31, characterised in that it is balanced and translating with two
25 growing stages of a finished product.
35. Mould (1610) according to claim 34, characterised

in that said fixed part (1612) includes eight identical dies in sets of four of which those for injection occupy a central part of said mould (1610), said mobile part (1614) comprising four of said
5 sliding elements (1620).

36. Mould (1610) according to claim 35, characterised in that said sliding elements (1620) comprise translating punchers in pairs so as to converge or diverge simultaneously during an opening between two
10 semi-cycles.

37. Mould (1610) according to claim 36, characterised in that in a first semi-cycle, with said punchers (1620) apart, a body of a beaker is moulded injecting a first material in four corresponding dies, in a
15 second semi-cycle, after having moved together said punchers (1620), a rubber material is overmoulded on top.

38. Mould (1610) according to claim 37, characterised in that, after having opened said mould (1610) and
20 removed said four finished pieces, the four punchers (1620) once again displace in a position distanced from each other to successively restart with an initial step.

39. Mould (1610b; 1610c) according to claim 34, characterised in that it is of the so-called "stack"
25 type, formed from three or more moulding planes.

40. Mould (1610b) according to claim 39, characterised
in that it has a central moulding plane equipped with
dies.
41. Mould (1610c) according to claim 39, characterised
5 in that it has a central moulding plane equipped with
punchers.
42. Mould (1710) according to claim 31, characterised
in that it realises a body of a toothbrush.
43. Mould (1710) according to claim 42, characterised
10 in that it is equipped with a double table device
which follows an impression which in turn translates
on a guide connected to a first table.
44. Mould (1710) according to claim 43, characterised
in that a screw is used actuated by a motor.
- 15 45. Mould (1810) according to claim 31, characterised
in that said translation takes place between
elements.
46. Mould (1910) according to claim 31, characterised
in that impression translate linked to trolleys.
- 20 47. Mould (2010) according to claim 31, characterised
in that elements remain connected to said fixed part
{2012} of said mould (2010).